Memorandum

To: *Stephanie Vaughn, EPA Region 2*
Elizabeth Franklin, USACE

From: *David A. Marabello, CDM Smith*
Scott Kirchner, CDM Smith

Date: *November 12, 2015*

Subject: *Summary of Oversight of SPME Sampler Retrieval Effort at River Mile 10.9*
October 27, 2015
Lower Passaic River Restoration Project

On behalf of the United States Environmental Protection Agency (EPA) and the United States Army Corps of Engineers (USACE), Kansas City District, CDM Federal Programs Corporation (CDM Smith) traveled to the River Mile (RM) 10.9 removal area on October 27, 2015 and provided field technical oversight of the retrieval of three solid-phase microextraction (SPME) samplers installed on August 26, 2015 at Station 0602. The field activities were conducted by AECOM on behalf of the Cooperating Parties Group (CPG). During this field effort, AECOM also tested the feasibility of excavating the sediments down to the geotextile layer after installing a makeshift wooden cofferdam at Station 0606 to restrict the flow of water in that area.

The SPME samplers retrieved by AECOM were previously installed as part of a performance monitoring event for the RM 10.9 sediment cap. The SPME passive porewater samplers are intended to assess contaminant concentrations in the sediment bed, in the active cap layer, and in the armor stone layer of the RM 10.9 cap. The samplers retrieved on October 27 were to be part of a baseline cap monitoring event that was to include SPME sampling at 10 locations along the length of the RM 10.9 cap. However, due to logistical difficulties, samplers were only installed at Station 0602 during the August mobilization. Once it became clear that SPME samplers could not be installed at the other sampling locations, the CPG decided to leave these three samplers in place. The three SPME samplers installed at this location on August 26, 2015 were as follows:

- A deep sampler, installed in the underlying sediment at approximately 36 inches below the mudline
- A mid-depth sampler, installed in the active layer at approximately 24 inches below the mudline
- A shallow sampler, installed in the armor layer at approximately 16 inches below the mudline

The SPME sample location and the location of the sediment excavation field test are presented in Figure 1. Photographs of field activities are presented in Attachment 1. Videos of field activities are presented in Attachment 2. A copy of the field logbook notes is provided in Attachment 3.

Personnel in Attendance
Katie Puckett – CDM Smith
Ryan McCarthy – AECOM
Scott Greenwood – AECOM

General Summary

The October 27, 2015 field activities consisted of:

- Collection of one grab sample of the soft sediments deposited above the cap at Station 0602
- Retrieval of the three SPME passive samplers previously deployed at Station 0602
- Processing fibers from the retrieved SPME samplers for chemical analyses
- Attempting to install a makeshift wooden cofferdam at Station 0606

Sediment Sampling

Prior to retrieval of the SPME samplers at Station 0602, AECOM collected a grab sample of the soft surface sediments on top of the cap, as required by the QAPP (AECOM 2015). The sample was collected just north of and within 8 inches of the northernmost SPME sampler at Station 0602 using a grab sampler. During sample collection, the sediments were observed to be approximately 3 to 5 inches thick on top of the cap and loosely consolidated. The sediment grab sample interval was from the sediment surface to approximately 4 to 5 inches below the sediment surface (i.e., the full depth of accumulated sediments above the armor stone layer at this location). AECOM personnel noted that the demarcation between the cap and the deposited sediments was clearly distinguishable. The grab sample location was recorded using a Trimble® Geo 7X handheld Global Positioning System (GPS) device.

After collection with the grab sampler, the sediments were transferred to a stainless steel bowl for processing. A stainless steel spoon was used to transfer sediments from the bowl to the amber glass sample jars. The sediments appeared to be very loosely consolidated, with a high water content. The sediment sample collection process lasted approximately 16 minutes, from 15:40 to 15:56, exclusive of preparation time. Four total sample jars were filled and packaged for shipment to SGS (the analytical laboratory).

SPME Sampler Retrieval and Sample Processing

The three SPME samplers retrieved during this field effort were installed on August 26, 2015, 62 days prior to their retrieval. The week of October 25 was selected to retrieve the samplers since it was the week of a lunar low tide, and low tide on October 27 occurred in the afternoon, at approximately 16:15. This allowed time for AECOM personnel to travel to the site and set up equipment before low tide. AECOM personnel retrieved the three samplers at 16:06, following

collection of the surface sediment sample. The SPME fibers from the samplers were then processed on shore by AECOM personnel. The general processing steps were as follows: Fibers were removed from the Henry sampler, wiped with a damp Kimwipe™, cut to 15-centimeter (cm) lengths using a razor blade, and stored in glass bottle filled with ultra-pure deionized (DI) water from the laboratory, leaving no headspace. The sample bottles were placed in a cooler along with the sediment sample bottles and bubble wrap and shipped to SGS for analysis. A summary of the SPME fibers retrieved is provided in the following table. Each sampler was deployed with nine SPME fibers, each measuring 15 cm (not including the length of tape on each end). However, many fibers broke prior to or during retrieval of the samplers, as noted in the table.

Sample Location	Approximate Fiber Recovery	Notes
Station 0602, Armor Layer	7 full-length (15-cm) fibers 1 broken piece measured as 3.9 cm 1 broken piece measured as 11.3 cm 120.2 cm total fiber length recovered	
Station 0602, Active Layer	96.7 cm total fiber length recovered	Sampler end cut off with saw to retrieve fiber. All fibers shorter than 15 cm. 120 cm of fiber needed for analyses.
Station 0602, Underlying Sediment	33.1 cm total fiber length recovered	Sampler sawed into smaller sections to retrieve fiber. All fibers shorter than 15 cm.

cm – centimeter

The shallow sampler was processed first. To facilitate sample fiber retrieval, a squirt bottle was used to rinse the end of the sampler with water prior to removing the fibers. Once the fibers were retrieved from the sampler, a razor blade was used to cut the tape from the ends of the fibers as needed, and then to cut each fiber to a length of 15 cm, with the exception of two fibers that were determined to be shorter than 15 cm. These two shorter fibers were measured to be 3.9 and 11.3 cm in length. A total of seven 15-cm fibers were collected from the shallow sampler, in addition to these two shorter fibers, for a total fiber length of 120.2 cm.

After the fibers were measured and cut, they were wiped clean with a damp Kimwipe™ to remove any particulate matter collected on the surface. The 15-cm fibers were then transferred to the cutting surface, which had been cleaned with water and wiped down several times for decontamination. The fibers were cut in half using a razor blade and then placed into a tall glass bottle. After all of the fibers were placed in the sample bottle, the bottle was completely filled with ultra-pure DI water from the laboratory, with no headspace. Processing of the shallow SPME sampler lasted approximately 13 minutes, from 16:10 to 16:23.

The mid-depth sampler was processed second. A small circular saw was used to cut off the end of the sampler, and the sampler was then flushed with water. A metal rod was used to push the SPME fibers out of the sampler. All fibers collected from the second sampler were shorter than 15 cm; lengths were measured and recorded by R. McCarthy. Processing of the mid-depth SPME sampler lasted approximately 22 minutes, from 16:32 until 16:54, including the time required to extract the fibers from the sampler. The total length of fibers collected from the second sampler was 96.7 cm.

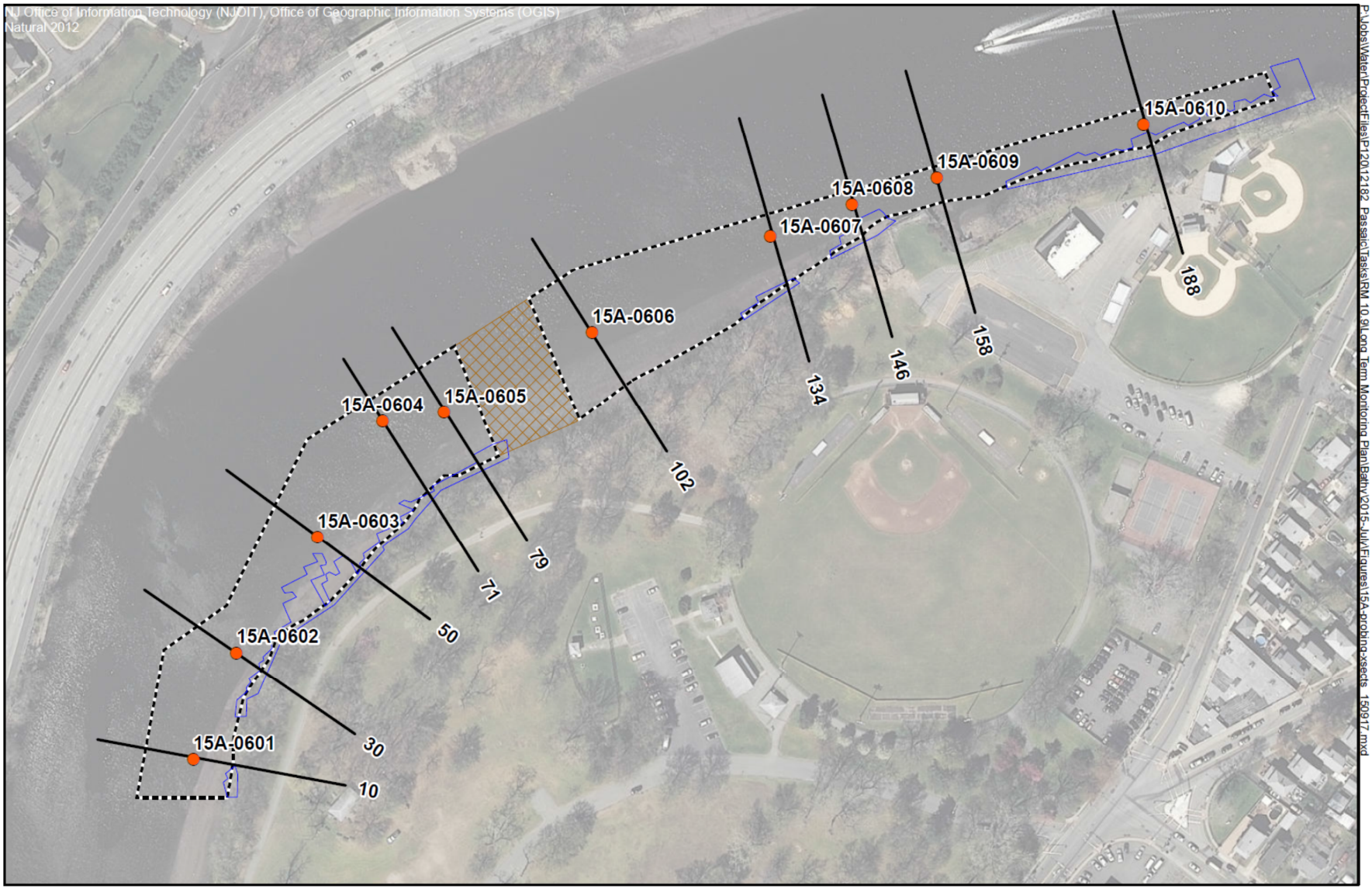
The sediment excavation field test, discussed in the following section, was performed after the second SPME sampler was processed, prior to processing of the deep SPME sampler. This was done in order to complete the field test during low tide. SPME sampler processing resumed at approximately 17:52 and was completed at 18:13, for a total of 21 minutes spent processing the deep SPME sampler. The handheld saw was used to cut off the end of the deep sampler and the sampler was flushed with water, but the fibers could not be retrieved at that point as the metal rod met with resistance when AECOM personnel attempted to push the fibers out. After cutting the sampler at the top of the screen, and then cutting the screened portion of the sampler in half, AECOM was able to retrieve the fibers from the sampler using the metal rod to push the fibers out. The fibers were then processed for analysis in the same manner as the previous SPME samplers. All fibers collected from the deep SPME sampler were again shorter than 15 cm. The total length of fibers collected from the deep sampler was 33.1 cm.

Sediment Excavation Field Test

After the second SPME sampler was processed, as discussed in the previous section, the sediment excavation field test was conducted in order to perform the work while the tide was low. Orange safety cones were set up around the AECOM truck at Station 0602 while the work at Station 0606 was conducted. The Trimble® Geo 7X was used to locate the test area for the cofferdam at Station 0606, and the makeshift wooden cofferdam was then installed by hammering it into the sediment. AECOM personnel used shovels to dig out the sediment above the armor stone from within the cofferdam. The purpose of this effort was to determine whether it was possible to excavate down to the geotextile layer by blocking off a section of the cap at low tide. At 17:40, approximately 35 minutes after the work began, AECOM personnel returned to shore, and S. Greenwood reported that they were able to dig down to the armor stone layer, at which point the rising tide began to fill the cofferdam with water, inhibiting further progress.

References

AECOM. 2015. Quality Assurance Project Plan, Lower Passaic River Restoration Project, River Mile 10.9 Post-Construction Monitoring – Draft. Rev. 0. June 17.



Dredge/Cap Area
No Dredge Area
Hard Pan
Probing Locations
Section Lines

0 50 100 200 300 400 500 Feet

N

Preliminary Draft – For discussion purposes only

Figure 1
Cross Section Lines
LTM Probing August 2015

September, 2015

AECOM

Attachment 1
Photographs of Field Activities

A selection of photographs from this field effort is provided in this attachment. The complete set of photographs can be found in the file labeled "Passaic_RM10.9_SPME_Retrieval_Photos.zip" in the SharePoint library at:
http://passaic.sharepointspace.com/members/Passaic%2017mile%20RIFSRA/RM%2010.9%20Photos/Passaic_RM10.9_SPME_Retrieval_Photos.zip

Photograph 1: Collecting surface sediment grab sample from Station 0602

10/27/2015 15:47

Photograph 2: Surface sediment grab sample collected from Station 0602

10/27/2015 15:50

Photograph 3: Filling sample bottles with surface sediment collected from Station 0602

10/27/2015 15:51

Photograph 4: Sample bottle filled with surface sediment collected from Station 0602

10/27/2015 15:54

Photograph 5: Retrieving SPME samplers from Station 0602

10/27/2015 16:04

Photograph 6: Two of the three SPME samplers retrieved from Station 0602

10/27/2015 16:07

Photograph 7: Opening SPME sampler to retrieve fibers

10/27/2015 16:07

Photograph 8: Rinsing end of SPME sampler

10/27/2015 16:09

Photograph 9: Cutting SPME fibers to 15 cm

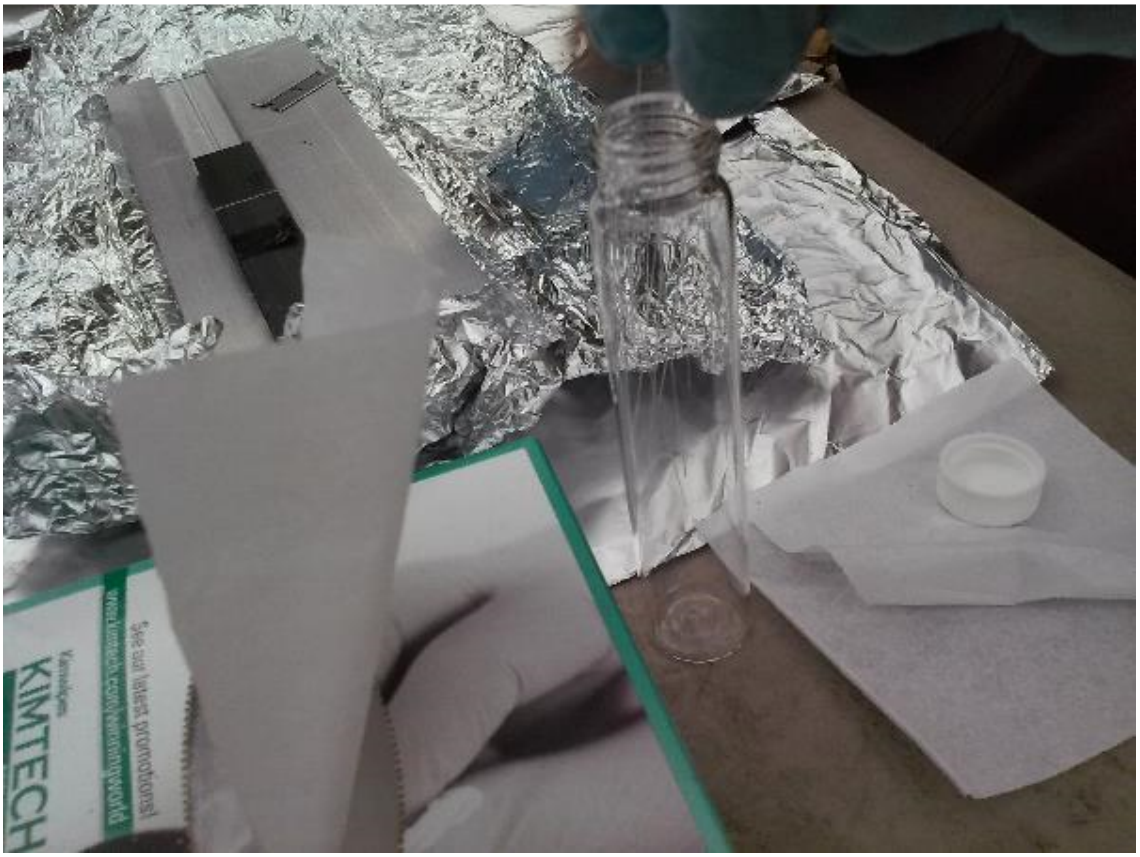
10/27/2015 16:13

Photograph 10: Decontaminating cutting surface

10/27/2015 16:16

Photograph 11: Wiping SPME fiber with a damp Kimwipe™

10/27/2015 16:17



Photograph 12: Placing SPME fibers in sample bottle

10/27/2015 16:22

Photograph 13: Filling sample bottle with ultra-pure DI water

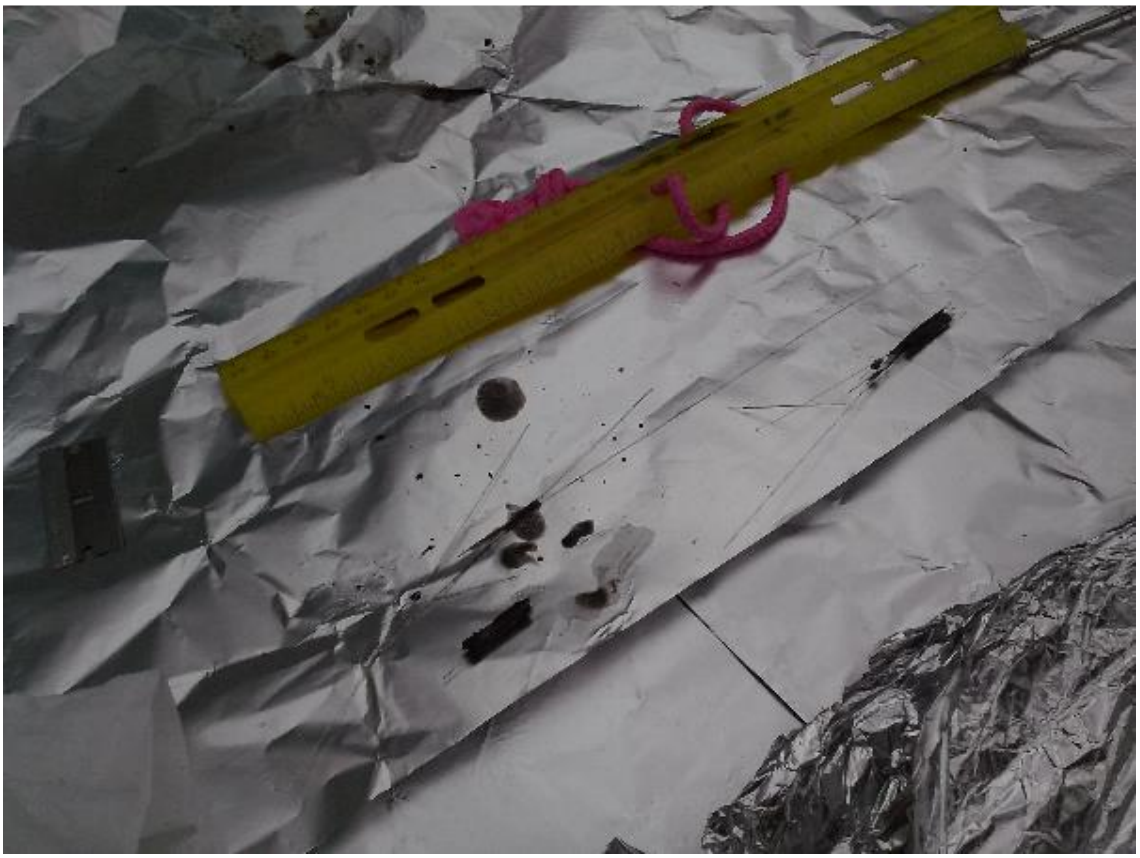
10/27/2015 16:23

Photograph 14: Cutting off end of SPME sampler using handheld saw

10/27/2015 16:32

Photograph 15: Flushing SPME sampler with water

10/27/2015 16:33



Photograph 16: Fibers retrieved from second SPME sampler

10/27/2015 16:36

Photograph 17: Measuring SPME fiber length

10/27/2015 16:49

Photograph 18: Fibers collected from second SPME sampler processed

10/27/2015 16:49

Photograph 19: Preparing to install wooden cofferdam

10/27/2015 17:04

Photograph 20: Locating Station 0606 using Trimble® Geo 7X

10/27/2015 17:06

Photograph 21: Excavating sediments within wooden cofferdam

10/27/2015 17:08

Attachment 2
Videos of Field Activities

Videos from this field effort are listed in this attachment, including the associated file names. The complete set of videos can be found in the file labeled "Passaic_RM10.9_SPME_Retrieval_Videos.zip" in the SharePoint library at:
http://passaic.sharepointspace.com/members/Passaic%2017mile%20RIFSRA/RM%2010.9%20Videos/Passaic_RM10.9_SPME_Retrieval_Videos.zip

Video 1: Collecting surface sediment grab sample from Station 0602

File name: 1027151547.mp4

10/27/2015 15:47

Video 2: Bottling surface sediment grab sample from Station 0602

File name: 1027151555.mp4

10/27/2015 15:55

Video 3: Retrieving SPME samplers from Station 0602

File name: 1027151605.mp4

10/27/2015 16:05

Video 4: Rinsing SPME fiber

File name: 1027151639.mp4

10/27/2015 16:39

Video 5: Decontaminating SPME fiber cutting surface

File name: 1027151640.mp4

10/27/2015 16:40

Video 6: Cutting and bottling SPME fiber

File name: 1027151641a.mp4

10/27/2015 16:41

Video 7: Wiping and measuring SPME fiber prior to bottling

File name: 1027151642.mp4

10/27/2015 16:42

Attachment 3
Field Logbook Notes

Location LPR - RM 10.9 Date 10/27/15

Project / Client USACE - RM 10.9 Oversight

SPME Sampler retrieval

13:50 Katie Puckett arrives on site for oversight of SPME sampler retrieval.
Weather: Overcast, ~60° F.
AECOM staff on site:
Ryan McCarthy
Scott Greenwood
AECOM preparing equipment for removal of SPME samplers at Station 2 and installation of makeshift cofferdam (wooden "donut") at station 0606.

14:30 Ryan and Scott walk to sampling location (station 2) to assess current conditions and look for SPME samplers, then drive truck to sampling location to set up sample processing area and wait for low tide.

15:30 Ryan and Scott preparing to collect sediment grab sample from station 2, just north of northernmost SPME sampler.

15:40 Ryan/Scott walk out to station 2 to collect sediment grab sample. Soft sediment is approximately 3"-5" deep above cap, covers their boots but no deeper. Ryan records GPS location using a Trimble Geo 7X.

Location LPR - RM 10.9 Date 10/27/15

Project / Client USACE - RM 10.9 Oversight

SPME sampler retrieval

~~15:45~~ KP 10/27/15

16:45 Collecting grab sample. Sediment sample collected from ~4"-5" below sediment surface (full depth of soft sediments above cap). Grab sampler used to collect sediments & transfer to bowl.

15:50 Processing sample. Spoon used to transfer sediments from bowl to amber glass bottles. Sediment appears loose and "fluffy", very high water content.

15:56 Done packing samples. 4 sample jars filled.

16:06 Ryan/Scott pulling samplers

16:10 Ryan using squirt bottle to rinse off the end of one sampler w/ water.

16:13 Fiber removed from first sampler. Razor blades used to cut to 15cm. 8 total fibers plus 1 broken piece. (Measured as 39mm).

16:19 Second short piece noted, measured as 113mm.
(7 full-length fibers total)

Location LPR - RM 10.9 Date 10/27/15

Project / Client USACE - RM 10.9 oversight

SPME sampler retrieval

16:20 Processing fibers. Fibers are wiped with a damp Kimwipe, then cut in half with a razer blade (cutting surface was cleaned with water and wiped down several times) and placed in a tall glass bottle.

16:23 First sampler done. Sample bottle filled with Talex water by Ryan. (Filled to top - no headspace) Scott opening second sampler.

16:32 Scott/Ryan using small circular saw to cut off end of sampler, then flush the sampler with water. Fibers were then able to be pushed out using metal rod / pulling them out of the end of the sampler.

16:43 Processing fibers from second sampler. All fibers shorter than 15cm. Ryan measuring & recording all lengths in logbook.

Procedure: Ryan cuts tape off fiber ends as necessary. Scott wipes down the fibers with a moist Kimwipe. Ryan then records the length (fiber placed on deconned surface) and places fiber

Location LPR - RM 10.9 Date 10/27/15

Project / Client USACE - RM 10.9 oversight

SPME sampler retrieval

in sample bottle.

16:50 Ryan adds up lengths of fibers collected so far - 880mm total. Need 120cm. Remaining fibers are very short but they continue processing.

16:54 second sample complete (but short of 120cm)

16:56 Packing up materials & equipment into truck and setting up orange safety cones around truck to go test cofferdam in area to the north. Final sample will be processed after (want to work with tide - currently low but going up)

17:05 Ryan using Trimble Geo 7x GPS unit to locate area in which to test cofferdam.

17:07 Ryan/Scott install makeshift cofferdam by hammering it into the sediment, then use shovels to dig out sediment from within. Purpose is to determine whether it is possible to dig down to the

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Location LPR - RM 10.9 Date 10/27/15

Project / Client USACE - RM 10.9 Oversight

SPME sampler removal

geotextile layer by blocking off a section of the cap at low tide.

17:40 Scott/Ryan return to shore. Scott reports that they were only able to dig down to the armor stone layer, at which point the box began filling with water. Heading back to Station 2.

17:52 Ryan/Scott using small saw to cut off tip of third sampler, then flush with water. Attempt to push fibers out with metal rod.

17:56 Ryan/Scott cut sampler at top of screen using small saw to try to retrieve fibers. Metal rod used to push fibers out. One fiber retrieved but rod still meeting with resistance.

18:00 Small saw used to cut remaining section of sampler in half. Fibers retrieved from these small sections of sampler using metal rod.

18:05 Processing fibers from third SPME sampler in same manner as previous samples. All fibers shorter than 15cm.

18:13 Third sample done, packed w/ other samples in one cooler filled w/ bubble wrap — going to SGS for analysis

SPME sample and sediment sample

18:30 Scott/Ryan finished packing up truck and leave site.

18:32 KP off site

Common Field Data Error Codes

Error codes are used to explain common mistakes and are written above or close to the mistake. Commonly used error codes include:

RE	Recording Error
CE	Calculation Error
TE	Transcription Error
SE	Spelling Error
CL	Changed for Clarity
DC	Original Sample Description Changed After Further Evaluation
WO	Write Over
NI	Not Initialed and Dated at Time of Entry
OB	Not Recorded at the Time of Initial Observation

Note: Error code should be circled, dated, and initialed when recorded.

KP 10/27/15

Hazard Classifications

Class 1 Explosives
Class 2 Gas
Class 3 Flammable Liquid
Class 4 Flammable Solids (Potential spontaneous combustion, or emission of flammable gases when in contact with water)
Class 5 Oxidizing Substances and Organic Peroxides
Class 6 Toxic (poisonous) and infectious substances
Class 7 Radioactive material
Class 8 Corrosives
Class 9 Miscellaneous dangerous goods

Container type abbreviations (for sampling guidelines)

BR - Boston Round • ABR - Amber Boston Round • AJ - Amber Jug • AWM - Amber Wide Mouth • Poly - Polyethylene Bottles • BOD - Bottle • CWM - Clear Wide Mouth